supposed that this hydrogen compound may play an important part in the subsequent production of electromotive force. It therefore appeared desirable to obtain experimental evidence as to whether hydrogen is so absorbed. The process we adopted for this purpose was founded upon the observation of Graham that hydrogen associated with palladium reduced ferri- to ferro-cyanide of potassium, and that generally in the occluded condition the element was more active chemically. We had previously ascertained that hydrogen associated with other elements, as platinum, copper, and carbon, was capable of reducing potassium chlorate to chloride. This method seemed to give trustworthy results, and therefore we applied it in this instance. As the result of several trials, however, we found that the amount of hydrogen associated with the reduced lead was almost inappreciable. Small as this quantity is, however, it is by no means impossible that it may be the cause of the exceedingly high electromotive force observed for the first few moments, on joining up a completely formed cell immediately after its removal from the circuit of the charging current. This, however, may be due, as Planté imagined, to the gaseous hydrogen itself. The principal if not the only function of the hydrogen of the water or sulphuric acid is therefore that of reducing the lead compounds.

By a totally different process Prof. Frankland has very recently come to the same conclusion as ourselves in regard to the exceedingly small amount of occluded hydrogen.

3. *Evolution of Oxygen from the Peroxide Plate.*—Planté noticed a small escape of gas from the negative plate of his cell immediately after its removal from the influence of the charging current. This he attributed to a decomposition of water by means of local circuits between the peroxide and the subjacent lead plate in contact with it.

The explanation we gave in our first paper (NATURE, vol. xxv. p 221) of the local action which goes on at the negative plate does not account for the escape of any gas—either oxygen or hydrogen. We therefore thought it of interest to ascertain the nature, and if possible the origin, of the gas noticed by Planté.

We found that the escape of gas from a Planté negative plate was very slight, and soon ceased; but we observed that it became much more pronounced when the temperature of the electrolytic liquid was raised. In order to get a sufficient quantity of the gas for examination, we prepared a negative plate according to the procedure of Faure, and then heated it in dilute acid, with an arrangement for collecting the gas as it was evolved. The amount of gas was still very small in comparison with that of the peroxide, but a sufficient quantity was collected to enable us to ascertain that it was oxygen. We next heated some of the electrolytic peroxide apart from the lead plate, and again noticed a similar evolution of gas, which was also found to be oxygen. This shows, therefore, that it was not a result of local action.

The gas has generally some odour of ozone, and, on testing the dilute acid between the plates of a Planté cell, we always found traces of something that bleached permanganate of potassium, and which might be either ozone or peroxide of hydrogen.

The origin of the gas noticed by Planté may be easily attributed to the oxygen which always passes off in quantity from the peroxide plate during the process of "formation." It is only necessary to suppose that some of this becomes condensed on the peroxide, and is gradually eliminated from it when the surrounding conditions are changed. But the matter is capable of another explanation. If peroxide of hydrogen be really formed in the liquid, it will exert its well-known influence on higher oxides, namely, that of reducing them and itself at the same time. As a matter of fact, if peroxide of lead is dropped into peroxide of hydrogen oxygen is evolved.

4. *Temperature and Local Action.*—Planté has recently pointed out that an elevation of temperature facilitates the formation of his secondary cell (*Comptes Rendus*, August, 1882). The character of the chemical changes which took place at the negative plate led us to think it exceedingly probable that this increase in the rate of formation arose from an augmentation in the amount of local action. Experiment showed such to be the case. Pairs of similar negative plates on Planté's model were allowed to remain in repose at 11° C. and 50° C. respectively, and the formation of the white sulphate was visibly more rapid at the higher than at the lower temperature. The same is also true with negative plates prepared by Faure's process. Thus we found that two similar plates kept in repose for an hour, the one at 11° C. and the other at 50° C., formed by local action 2·6 and 7·4 per cent. of lead sulphate respectively. On two other plates the proportions were 7·6 and 9·5 per cent. respectively. These observations of course by no means exclude the idea that an increase of temperature may facilitate the other chemical changes that take place in the formation of a lead and lead-oxide cell.

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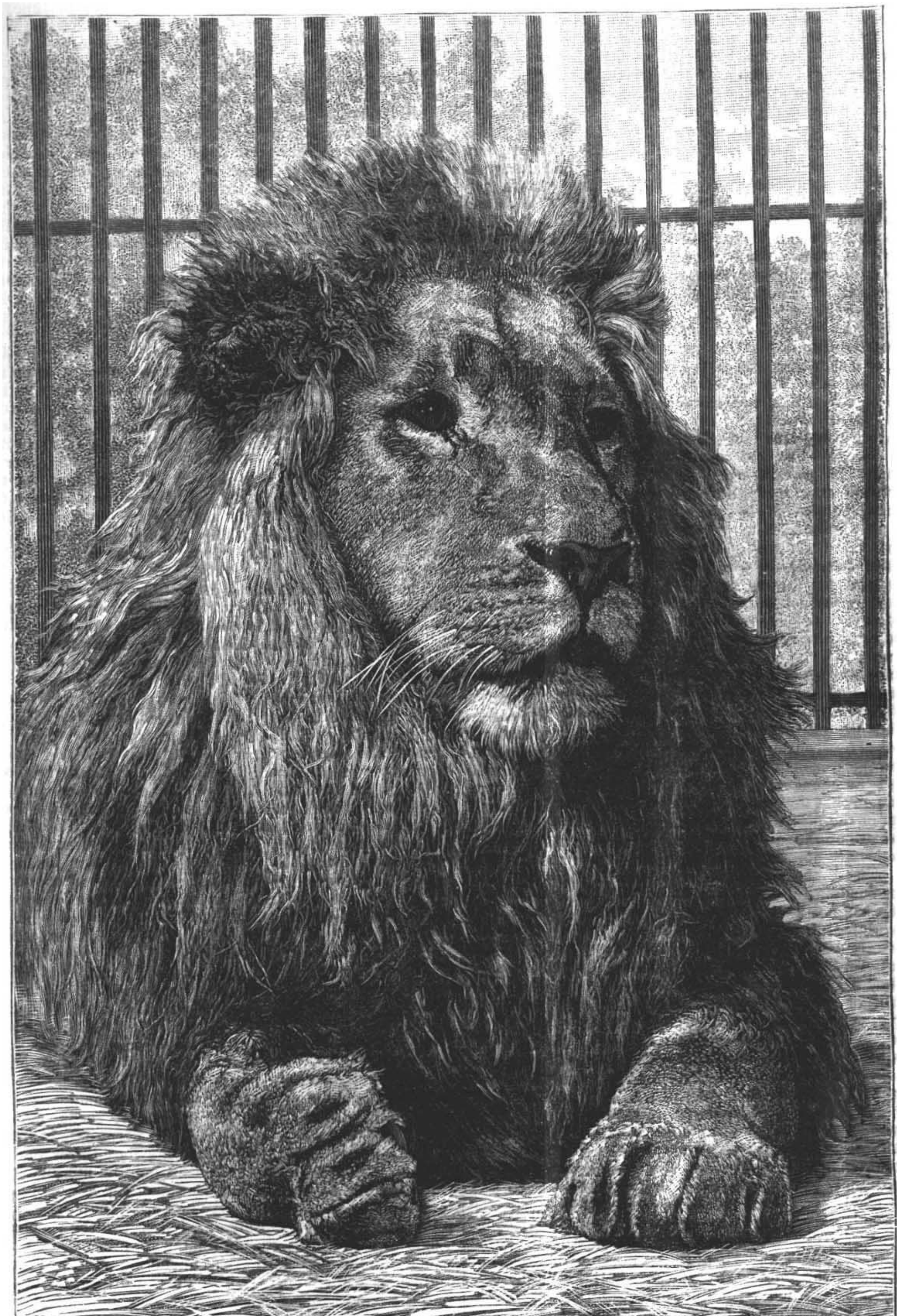
THE LION AT REST

THE illustration which we give on next page, from *La Nature*, is after a photograph of one of the lions in the Zoological Gardens, London. This photograph may be regarded as one of the numerous triumphs of instantaneous photography, valuable both to art and science. The original was rephotographed in Paris directly on wood, by means of a special collodion, at present much used. This has assured a perfectly faithful reproduction of the original, exhibiting all the characteristic details of the lion at rest. The illustration tells its own story.

ON THE RELATIONS OF THE FIG AND THE CAPRIFIG [1]

THE relations of the fig and the caprifig, or the cultivated varieties of fig and the wild form of the Mediterranean region, have been variously explained by different writers, including those recent ones whose works are cited below. Intimately connected with this question is the process of caprification, so often and so circumstantially described by ancient and modern authors, amongst the later of whom we may mention Gasparrini. Graf Solms-Laubach's essay is an elaborate work of upwards of one hundred quarto pages, embodying the results of much research. Not the least interesting part is that treating of caprification, or perhaps we might say the manner in which fertilisation is effected. The author regards the cultivated edible varieties of fig as constituting one race, and the wild caprifig as another race of one and the same species; and the former as having developed from the latter under the influences of cultivation. Gasparrini, on the contrary, described them as distinct genera. Dr. Fritz Müller takes an altogether different view. He says it appears to him far more likely that the fig and caprifig represent, as Linnæus supposed, different forms, the male and the female, belonging together, and not proceeding the one from the other, but which developed side by side, before any cultivation, through natural selection. An examination of the facts adduced by Solms-Laubach himself seems to point to the correctness of Müller's view. But we will set them forth as briefly as possible, leaving the reader to judge for himself. The responsibility of their accuracy rests with the author whom we are quoting. It

[1] "Die Herkunft, Domestication und Verbreitung des gewöhnlichen Feigenbaums (*Ficus Carica*, L.)." Von Grafen zu Solms-Laubach. (Göttingen, 1882.)—"Caprificus und Feigenbaum." Von Fritz Müller. *Kosmos*, xi. p. 306.—"Sulla Caprificazione, &c." G. Arcangeli. Processi Verbali della Società Toscana di Scienze Naturali, November, 1882.


E.A.TILLY. s.c.

may be well to explain, in the first place, the nature of the fruit of the fig, as it is something more than a seed-vessel of one flower. The fleshy part is a thickened hollow receptacle, closed, except a very narrow aperture at the top, and containing numerous minute flowers crowded together all over the inside of the cavity. Both the fig and caprifig produce three more or less distinct crops of fruit in the course of the year. Each of these crops of fig and caprifig bears a distinctive name; but the three crops of the former do not all reach maturity. In this country only one crop ripens. The varieties of the fig in Naples, whether cultivated or wild, produce fruit at least twice a year, and different varieties exhibit diverse phenomena in the degree of development and maturation of the several crops. In the fig the tissue of the receptacle or inflorescence is fleshy, and the perianth and pedicels of the individual flowers it contains thicken and abound in a sugary juice; whilst the fruit of the caprifig remains hard and milky up to maturity, or only imperfectly softens just at last without any secretion of sugar, and then shrivels and dries up. As long ago as 1770, Colin Milne[1] recorded the fact that the varieties of fig cultivated in England contained only female flowers; and Graf Solms found that male flowers were almost invariably altogether wanting in the varieties cultivated in Naples, and in the very rare exceptional instances in which they were present they were imperfectly developed and abnormal, the anthers being commonly replaced by leafy organs. On the other hand the inflorescence of the caprifig, as observed in Naples, usually contained both male and female flowers, the latter covering the greater part of the surface of the cavity, and the former restricted to a zone, variable in breadth, in the neighbourhood of the apical aperture. It is, moreover, noteworthy that the inflorescence exhibits proterogynous dichogamy in a marked degree. At the time when the female flowers are in a receptive condition the male flowers are still in a very early stage of development. The significance of this will perhaps be better understood after reading the description of caprification—that is if we may assume with Müller that this is really a process of fertilisation, in which there is a mutual adaptation of the inflorescences of the fig and caprifig and the insect which is an agent in procuring fertilisation. Before proceeding to that description, it should be mentioned that a variety of the fig exists in Brittany in which normal male flowers are abundantly produced. Yet, as in the caprifig, the males are not developed until long after the females have passed the receptive stage. The position this variety occupies in relation to other varieties and to the caprifig has not been ascertained. It may be a reversion to an original monœcious condition.

With regard to caprification, it was known to the ancients that an insect inhabits the fruit of the caprifig, and they also discovered that the visits of this insect to the fruit of the fig exercised some beneficial influence, either in accelerating ripening or in hindering the fall of the fruit before it was ripe. Consequently, branches of the caprifig were hung on the fig-trees at a certain season to insure these visits, and effect what was termed caprification. The insect that operates in this manner is a small hymenopter (*Blastophaga grossorum*, Grav syn. *Cynips psenes*, Linn.), the complete annual cycle of development of which takes place within the three crops of fruit of the caprifig, whilst only one generation visits the fig, and that, as will be seen, to no advantage to the insect itself. In order to render what follows easily understood, we will give the present Neapolitan names of the three crops of the caprifig. The fruits that hang through the winter and ripen in April are called *mamme* (*cratitires* of the ancients). These are followed by the *profichi* (*orni*), which ripen in June, and the *mammoni* (*fornites*), which ripen in August and September. If we closely examine the *profichi* when fully ripe in June, we see here and there a black-winged insect emerging from the orifice at the top, its hairy body dusted over with pollen grains that have adhered to it in its passage through the zone of male flowers. And if we cut open one of these fruits, we find a considerable number of these insects, all striving to find the way out. These are females and associated with them are some helpless wingless males, and very often a number of a slender ichneumon as well. The female of this generation visits not only the *mammoni*, but also the fruits of the fig, if there are any at hand, in order to deposit her eggs. Now the remarkable fact in connection with this is that she is able to do so effectually in the *mammoni*, but not in the edible fig, though she succeeds in penetrating the fruit far enough to convey pollen to the female flowers, perishing in the act. Furthermore the generation of the insect that develops in the *mammoni* deposits eggs in the *mamme*, and the generation proceeding therefrom finds an asylum for its progeny in the *profichi*. Respecting the reproduction of the *Blastophaga*, Graf Solms claims to have made the important discovery that the eggs must be deposited within the integuments of the ovule itself; otherwise they do not develop. The fertility of the insect is astonishing, a very few of them being able to pierce the numerous female flowers of a fruit of the caprifig. For this purpose the ovipositor is thrust between the branches of the stigma, down the pollen channel of the style into the ovary, and into the solitary ovule itself. This act causes a gall-formation, whilst it does not prevent the development of the ovule into an imperfect seed, which shelters and nourishes the larva that escapes from the egg.

The foregoing condensed extracts are perhaps sufficient to give an idea of the only way in which the female flowers of the fig are fertilised by the male flowers of the caprifig. It seems to be almost certain that seedling figs are unknown in countries where the caprifig does not exist. Where it is found apparently wild it is rather as the remains of cultivation than as plants sprung up from seeds. With regard to the origin of some of the cultivated varieties purporting to have been raised from seeds produced without the intervention of the caprifig, they offer a field for further research and experiment. Possibly they owe their origin to what has been called parthenogenesis, and more recently adventitious embryo-formation. Passing over many other interesting particulars in Graf Solm's essay, we come to one which Dr. Müller regards as strongly in favour of his view. It is this, the seedling offspring of the fig, fertilised by the caprifig, are said to consist of varieties of the fig and the caprifig, pure and simple, without any forms intermediate beween the two parents. On the other hand it is stated that a perfect seed is now and then found in the *profichi*. Prof. Arcangeli, in a later memorandum on the subject, states that he is unable to pronounce judgment in favour of one or the other of these views, and confines himself to recording the following observations on wild and cultivated forms. The *Fico verdino* and the *Fico piombinese* are commonly cultivated varieties in Pisa, yet he had never found a single perfect seed in their fruit, whereas in the fruit of the *Fico biancolino*, which is considered as a wild form, among numerous imperfect seeds he had found some perfect ones, which germinated freely. Whatever light future investigations may throw on this subject, the foregoing facts concerning the life-history of the *Blastophaga* and the fertilisation of the fig are of great interest. In conclusion it may be added that Graf Solms found the same or a closely allied insect in the species of Ficus that are most closely related to *Ficus Carica*, and which inhabit Western Asia, including North-Western India. As Müller suggests, it would be worth while looking into the matter to see whether they offer male and female forms.

W. BOTTING HEMSLEY

[1] "A Botanical Dictionary," in the article on "Caprification."